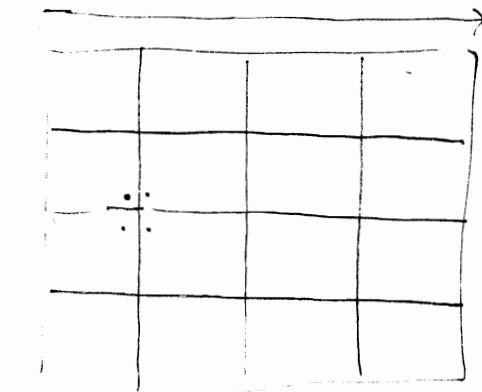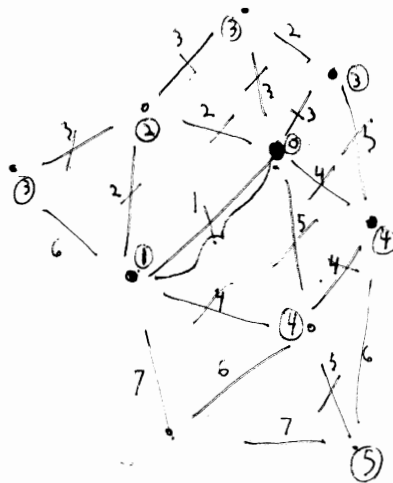Computer Science 360
Midterm Examination
Open Text Book and Notes

Time: 75 minutes   November 1, 2007
Marks

20 1. Let $G = (V, E)$ be a connected undirected graph where the edges have positive integer edge weights associated with them, and a vertex $s \in V$ is the source.

Provide an algorithm that for each vertex $t \in V$ reports the minimum last edge weight on a nondecreasing path from s to t (∞ if there is no such path). A path $v_1, v_2, \ldots v_r$ is nondecreasing if $w(v_i, v_{i+1}) \le w(v_{i+1}, v_{i+2})$ for $i = 1, 2, \ldots r - 2$.

20 2. A subsequence is palindromic if it reads the same left to right as right to left. For example, the sequence g,e,o,m,e,t,r,i,c,a,l,g,o,r,i,t,m has many palindromic subsequences such as g,e,o,e,g or t,r,r,t or m,i,a,i,m. Provide an efficient dynamic programming algorithm that takes a sequence $S[1 \ldots n]$ and returns the length of the longest palindromic subsequence in S.

20 3. Given a set of n identically sized squares in the plane, where the center of each square is given and the side length of all squares is equal to the constant s, describe an efficient divide-and-conquer approach to the problem of detecting whether or not any two of the squares intersect.